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K. Tommy Haraldsson

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EXAMINER

SANDERS, JAMES M

ART UNIT

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/521,635	<b>Applicant(s)</b> HARALDSSON ET AL.	
	<b>Examiner</b> JAMES SANDERS	<b>Art Unit</b> 1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10 September 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) 7-25 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6 and 26-33 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 January 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>3/25/09</u> . | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

This is a final Office action in response to an Office action reply filed 9/10/09, in which claims 1, 4-6 and 26 were amended, and claims 30-33 were added.

#### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
  2. Ascertaining the differences between the prior art and the claims at issue.
  3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
2. Claims 1-2 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ward et al ("UV Free-Radical Polymerization for Micropatterning Poly(ethylene glycol)-containing Films," Proceedings of the SPIE, Complex Mediums, 4097, 221-228, 30 July – 1 Aug. 2000, already of record), and further in view of Klaerner et al (US 2002/0001845).

For claim 1, Ward et al teach a method for making a polymeric layer on a substrate comprising the steps of: a) forming a layer of a liquid comprising a photopolymerizable polymer precursor and an iniferter between the substrate and an at least partially transparent element; b) activating the iniferter by exposing the liquid layer to light through at least partially transparent element, thereby polymerizing one or more regions of the liquid layer to form a polymeric layer; and c) removing any unpolymerized region or regions of the liquid layer (Fig. 4, pg 222 paragraph 5 and pg 223 paragraph 2).

Ward et al do not teach a previously fabricated polymeric layer having surface iniferter precursor groups serves at least in part as the substrate.

However, in a related field of endeavor pertaining to controlled free radical polymerization techniques, Klaerner et al teach a previously fabricated polymeric layer having surface iniferter precursor groups serves at least in part as the substrate ([0019]-[0020]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Klaerner et al with those of Ward et al for the benefit of grafting polymer with the substrate as suggested by Klaerner et al ([0065]).

For claim 2, though Ward et al do not explicitly teach the at least partially transparent element is a photomask, and a patterned polymeric layer is formed, Ward et al do teach using a photomask to form a patterned polymeric layer (with monomer B in Fig. 4, pg 222 paragraph 5 and pg 223 paragraph 2) and it therefore would have been

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obvious to one of ordinary skill in the art at the time the invention was made to use a photomask to form a patterned polymeric layer with another layer, such as the layer of the previous combination.

For claim 4, Ward et al teach the liquid further comprises a photoinitiator other than an iniferter or iniferter precursor (pg 222 paragraph 3). Further regarding a previously fabricated polymeric layer having surface iniferter precursor groups serves at least in part as the substrate taught as obvious by Klaerner et al above, Klaerner et al also teach the rate of surface initiation is rapid enough relative to bulk polymerization to generate covalent linkages to the previous layer prior to complete curing of the new layer ([0101]-[0102]).

3. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ward et al ("UV Free-Radical Polymerization for Micropatterning Poly(ethylene glycol)-containing Films," Proceedings of the SPIE, Complex Mediums, 4097, 221-228, 30 July – 1 Aug. 2000, already of record), further in view of Klaerner et al (US 2002/0001845), and further in view of Mancini et al (US 6387787).

The previous combination teaches the invention as discussed above.

The previous combination does not teach the at least partially transparent element has three-dimensional features on the side of the element which contacts the liquid.

However, in a related field of endeavor pertaining to lithographic templates, Mancini et al teach the at least partially transparent element has three-dimensional features on the side of the element which contacts the liquid (cl 3 Ins 27-39).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Mancini et al with those of the previous combination for the benefit of increased forming flexibility in producing the micro-electronic devices, micro electro mechanical devices and microfluidic devices as suggested by Mancini et al (cl 6 Ins 39-46).

4. Claims 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ward et al ("UV Free-Radical Polymerization for Micropatterning Poly(ethylene glycol)-containing Films," Proceedings of the SPIE, Complex Mediums, 4097, 221-228, 30 July – 1 Aug. 2000, already of record), further in view of Klaerner et al (US 2002/0001845), and further in view of Sansone et al (US 5084203).

Ward et al/Klaerner et al teach the invention as discussed above, including the liquid comprises a photoinitiator other than an iniferter or iniferter precursor and the rate of surface initiation is rapid enough relative to bulk polymerization to generate covalent linkages to the previous layer prior to complete curing of the new layer (see citations above).

Ward et al/Klaerner et al do not teach the polymer precursor is a multivinyl monomer.

However, in a related field of endeavor pertaining to a synthetic resin matrix, Sansone et al teach the polymer precursor is a multivinyl monomer (cl 2 Ins 34-37).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Sansone et al with those of Ward et al/Klaerner et al for benefit of using a suitable starting material as suggested by Sansone et al (cl 2 lns 14-18).

5. Claims 26-27, 30 and 32-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ward et al ("UV Free-Radical Polymerization for Micropatterning Poly(ethylene glycol)-containing Films," Proceedings of the SPIE, Complex Mediums, 4097, 221-228, 30 July – 1 Aug. 2000, already of record), further in view of Klaerner et al (US 2002/0001845), and further in view of Fudim (WO 88/06494, already of record).

Ward et al/Klaerner et al teach the invention as discussed above, including that at least one of the polymeric layers is a patterned polymeric layer.

Ward et al/Klaerner et al do not teach removing the first at least partially transparent element; forming a second layer of a second liquid comprising a second polymer precursor and a second iniferter or iniferter precursor at least in part between the first polymeric layer and a second at least partially transparent element; activating the second iniferter or iniferter precursor by exposing the second liquid layer to light through the second at least partially transparent element, thereby polymerizing at least a region of the second liquid layer to form a second polymeric layer; and removing any unpolymerized region or regions of the second liquid layer.

However, in the same field of endeavor pertaining to production of three dimensional objects by photo-solidification, Fudim teaches removing the first at least partially transparent element (pg 5 lns 35-36); forming a second layer of a second liquid

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comprising a second polymer precursor at least in part (pg 10 lns 1-3) between the first polymeric layer and a second at least partially transparent element; exposing the second liquid layer to light through the second at least partially transparent element, thereby polymerizing at least a region of the second liquid layer to form a second polymeric layer; and removing any unpolymerized region or regions of the second liquid layer (pg 6 lns 1-10).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Fudim with those of Ward et al/Klaerner et al for the benefit of adding additional layers to enlarge a formed object as suggested by Fudim (pg 5 ln 35).

Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a second iniferter or iniferter precursor in a second layer and activate the second iniferter or iniferter precursor by exposing the second liquid layer to light through the second at least partially transparent element, since one having ordinary skill in the art at the time the invention was made would recognize these limitations as nothing more than the duplication of parts for a multiple effect and could seek the benefits of increased bonding between layer surfaces and “living” radical polymerization within multiple layers. Please see *In re Harza*, 274 F.2d 669, 671, 124 USPQ 378, 380 (CCPA 1960) for further details.

The previous combination does not explicitly teach the second liquid further comprises a photoinitiator other than an iniferter or iniferter precursor, and the rate of surface initiation is rapid enough relative to bulk polymerization to generate covalent

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linkages to the previous layer prior to complete curing of the new layer; and the first and second polymerizable precursors are the same.

However, Ward et al do teach the first liquid comprises a photoinitiator other than an iniferter or iniferter precursor (pg 222 paragraph 3). Further regarding a previously fabricated polymeric layer having surface iniferter precursor groups serves at least in part as the substrate taught as obvious by Klaerner et al above, Klaerner et al also teach the rate of surface initiation is rapid enough relative to bulk polymerization to generate covalent linkages to the previous layer prior to complete curing of the new layer ([0101]-[0102]). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the second liquid further comprise a photoinitiator other than an iniferter or iniferter precursor, and the rate of surface initiation rapid enough relative to bulk polymerization to generate covalent linkages to the previous layer prior to complete curing of the new layer; and the first and second polymerizable precursors be the same, since one having ordinary skill in the art at the time the invention was made would recognize these limitations as nothing more than the duplication of parts for a multiple effect and could seek benefits of increased bonding between layer surfaces and “living” radical polymerization within multiple layers, and the convenience of using the same polymerizable precursors in both layers. Please see *In re Harza*, 274 F.2d 669, 671, 124 USPQ 378, 380 (CCPA 1960) for further details. Also, it is inherent that the first and second layers are crosslinked.

6. Claims 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ward et al (“UV Free-Radical Polymerization for Micropatterning Poly(ethylene glycol)-

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containing Films,” Proceedings of the SPIE, Complex Mediums, 4097, 221-228, 30 July – 1 Aug. 2000, already of record), further in view of Klaerner et al (US 2002/0001845), further in view of Fudim (WO 88/06494, already of record), and further in view of Pomerantz et al (EP 0322257, already of record).

The previous combination teaches the invention as discussed above.

The previous combination does not teach filling one or more cavities in the previous polymeric layer with a sacrificial material before forming the layer of the subsequent liquid or removing excess sacrificial material from the surface of the previous polymeric layer before forming the layer of the subsequent liquid.

However, in a related field of endeavor pertaining to three dimensional modeling, Pomerantz et al teach filling one or more cavities in the previous polymeric layer with a sacrificial material before forming the layer of the subsequent liquid and removing excess sacrificial material from the surface of the previous polymeric layer before forming the layer of the subsequent liquid (Fig. 6, cl 13 ln 13 to cl 14 ln 5).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Pomerantz with those of the previous combination for the benefit of enabling complex or hollow objects to be formed as suggested by Pomerantz et al (cl 7 lns 26-27).

7. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ward et al (“UV Free-Radical Polymerization for Micropatterning Poly(ethylene glycol)-containing Films,” Proceedings of the SPIE, Complex Mediums, 4097, 221-228, 30 July – 1 Aug. 2000, already of record), further in view of Klaerner et al (US 2002/0001845), further in

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view of Fudim (WO 88/06494, already of record), and further in view of Sansone et al (US 5084203).

The previous combination teaches the invention as discussed above.

The previous combination does not teach the second photopolymerizable polymer precursor is a multivinyl monomer.

However, in a related field of endeavor pertaining to a synthetic resin matrix, Sansone et al teach the polymer precursor is a multivinyl monomer (cl 2 lns 34-37).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Sansone et al with those of the previous combination for benefit of using a suitable starting material as suggested by Sansone et al (cl 2 lns 14-18).

### ***Response to Arguments***

Applicant's arguments filed 9/10/09 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

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mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAMES SANDERS whose telephone number is 571-270-7007. The examiner can normally be reached on Monday through Friday, 8 AM to 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Del Sole can be reached on 571-272-1130. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JMS

/Joseph S. Del Sole/

Supervisory Patent Examiner, Art Unit 1791